Logic model-based failure analysis of intrapartum antibiotic prophylaxis (IAP)

James A. McGregor[1,2]
Janice I. French[2]
Marti Perhach[1]

1. Group B Strep International
2. LA Best Babies Network

to prevent all cases of perinatal group B strep disease

Background:

- Early and late-onset group B strep neonatal (EOGBS/LOGBS) sepsis and prenatal-onset (POGBS) sepsis are among the commonest potentially preventable causes of perinatal sepsis caused by death and disability.
- Prenatal-onset (POGBS) may be the cause of some IAP failures.
- Logic Modeling is the collection and analysis of relevant information in order to provide patients and providers with knowledge for improving clinical and community care.
- Failure Analysis has the goal of clarifying corrective actions (Block and Geither).

Objective:

To review and analyze means to prevent POGBS, EOGBS and LOGBS perinatal disease.

Methods:

- We identified relevant articles using searchable databases (Medline, PubMed, and Google using the terms GBS, *streptococcus* and antibiotic prophylaxis (IAP) (1970-2018).
- We also analyzed stories of GBS-infected babies sent in by their parents to Group B Strep International.

Results:

- No health agency-recommended prevention tools have been identified for prenatal-onset sepsis.
- Studies of early-onset sepsis are limited.
- Late-onset sepsis has not been shown to be preventable using antimicrobials.

- Tudela et al (2012) hypothesize that early-onset GBS represents a spectrum of infection that often precedes birth.
- IAP for EOGBS disease prevention is not administered until a woman's labor has started or her membranes have ruptured.
- Therefore, infections that precede the onset of labor or membrane rupture would be unlikely to be prevented by IAP.

- According to the World Health Organization, about half of all stillbirths occur in the intrapartum period, representing the greatest time of risk.
- Questions for researchers:

How often is GBS the cause of intrapartum stillbirth?

Are GBS stillbirths more or less common during the intrapartum period due to an increase in invasive procedures closer to term?

- Giménez (2019) noted that the majority of neonatal infections derive from dyads in which GBS screening was NEGATIVE (58%) or Not Indicated (42%!).
- There were only 3/49 instances of failure to follow protocol in this Barcelona study.
- There were no instances of antibiotic resistance associated with disease.

- These and other researchers recommended "improved communication" to better implement protocols.
- Further, Ohlsson's Cochrane Analysis (2012) concluded that recommended IAP protocols were insufficiently proven (efficacy @ 60%).

- IAP is not indicated for a planned cesarean delivery performed prior to labor starting or membrane rupture.*
- A risk does exist for transmission of GBS from a colonized mother to her infant during a cesarean delivery; however, the risk is considered extremely low for full term infants.*
- Cephalosporin is routinely administered during C-sections to help prevent infection and may offer some measure of protection against GBS infection.
- GBSI advocates that patients talk with their provider about the risks vs. benefits of starting IAP for GBS well before their incision if they are having a planned C-section

*CDC 2010 guidelines for the Prevention of Perinatal Group B Streptococcal Disease

Conclusion:

Novel or incompletely tested approaches include:

- VACCINATION
- PROBIOTICS
- Immunomodulation

- Expanded screening and treatment of UTI, ASB, combined maternal/ newborn prophylaxis

- Patient involved/monitored care (checklists, avoidance of invasive procedures, i.e., “membrane stripping”) will need to be expeditiously evaluated when recommended protocols become available

- Analyze cases in which babies likely became infected prior to the mother’s labor starting or membrane rupture in order to prompt new prevention strategies
- Recognize that some live births should be considered as “prenatal-onset” if deemed that GBS infection began prior to labor starting or membrane rupture

Leah was born very sick via C-section and lived six days

“Unlike many women’s stories whose babies die from a GBS infection, I DID know that I was positive and DID receive antibiotics at the time of delivery. Unfortunately, that was too late. The infection had passed through my intact membranes.”

Bevin Tomlin, Leah’s mother